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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/891,501	06/27/2001	Jun Akikusa	SHG-0047	8796

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EXAMINER
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ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

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DATE MAILED: 06/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/891,501

Applicant(s)

AKIKUSA ET AL.

Examiner

Raymond Alejandro

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1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other:

## DETAILED ACTION

### *Response to Amendment*

This communication is responsive to the amendment filed on 05/23/03. The applicants have overcome the objection, the 35 USC 112 rejections and the 35 USC 102 rejection. However, the claims are finally rejected over the same art as seen below for the reasons of record.

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto et al 6287716.

The instant application is directed to a solid oxide fuel cell wherein the disclosed inventive concept comprises the specific electrolyte layers.

As to claims 1, 3-5:

Hashimoto et al disclose the following (claim 3):

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3. A solid oxide fuel cell having a laminate structure, comprising:

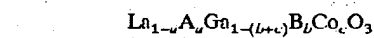
- an air electrode layer;
- a fuel electrode layer; 30
- a solid electrolyte layer interposed between said air electrode layer and said fuel electrode layer; and
- an intermediate layer interposed between said electrolyte layer and said air electrode layer;

wherein said electrolyte layer comprises a material specified by  $\text{La}_{1-a}\text{A}_a\text{Ga}_{1-(b+c)}\text{B}_b\text{Co}_c\text{O}_3$ , said air electrode layer comprises a material specified by  $\text{La}_{1-a}\text{A}_a\text{CoO}_3$ , and said intermediate layer comprises a material specified by  $\text{La}_{1-a}\text{A}_a\text{Ga}_{1-(f+g)}\text{B}_f\text{Co}_g\text{O}_3$ , and wherein A is at least one element selected from the group consisting of 40 Sr and Ca, B is at least one element selected from the group consisting of Mg, Al, and In, and  $0.05 \leq a \leq 0.3$ ,  $0 \leq b$ ,  $c \leq 0.3$ ,  $0 \leq c \leq 0.15$ ,  $b+c \leq 0.3$ ,  $0 \leq d \leq 0.5$ ,  $0 \leq f \leq 0.15$ ,  $0.15 < g \leq 0.3$ , and  $f+g \leq 0.3$ ;

and wherein a composition continuously changes in each 45 of an interface between said intermediate layer and said electrolyte layer and an interface between said intermediate layer and said air electrode layer.

Hashimoto et al also disclose the following composition (COL 6, lines 9-20):

The inventors of the present invention have found, surprisingly, from among perovskite type materials, a material exhibiting a high oxide ion conductivity superior to that of YSZ. That material is lanthanum gallate oxide expressed by the following formula:



wherein A is at least one element selected from the group consisting of Sr and Ca, B is at least one element selected from the group consisting of Mg, Al, and In, wherein  $0.05 \leq a \leq 0.3$ ,  $0 \leq b \leq 0.3$ ,  $0 \leq c \leq 0.15$ , and  $b+c \leq 0.3$ .

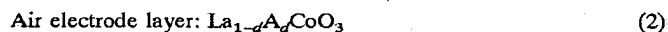
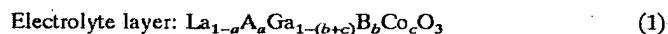
Hashimoto et al also disclose the specific layer compositions (COL 8, lines 37-50/ COL

9, lines 1-8):

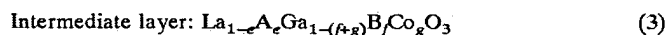
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Preferably, the materials that satisfy the above requirements are the ones expressed by the following general formulas:

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Here, A is one element or two elements selected from among Sr and Ca, B is one element or two or more elements selected from among Mg, Al, and In, and  $0.05 \leq a \leq 0.3$ ,  $0 \leq b$ ,  $e \leq 0.3$ ,  $0 \leq c \leq 0.15$ ,  $b+c \leq 0.3$ ,  $0 \leq d \leq 0.5$ ,  $0 \leq f \leq 0.15$ ,  $0.15 < g \leq 0.3$ , and  $f+g \leq 0.3$ .

$0.02 \leq c \leq 0.10$ , and preferably  $0.1 \leq b+c \leq 0.25$ , more preferably  $0.15 \leq b+c \leq 0.22$ . The preferred composition in the air electrode layer according to formula (2) is  $0.1 \leq d \leq 0.4$ . The preferred compositions in the intermediate layer according to formula (3) are  $0.1 \leq e \leq 0.3$ ,  $0.17 \leq g \leq 0.3$ , and  $0 \leq f \leq 0.13$ ,

It is also disclosed that the composition continuously change in an interface between the intermediate layer and the air electrode layer and in an interface between the intermediate layer and the electrolyte layer (COL 7, lines 58-67).

It is disclosed that the thickness of the electrolyte layer is preferably within a range of 10-200  $\mu\text{m}$  (col 11, lines 55-59); and the thickness of the intermediate layer is preferably within a range from 10-100  $\mu\text{m}$ ; more preferably 20-90  $\mu\text{m}$ ; most preferably 30-80  $\mu\text{m}$  (col 13, lines 50-60).

With respect to claim 6:

It is disclosed that the composition continuously changes in each of an interface between said intermediate layer and said electrolyte layer and an interface between said intermediate layer and said air electrode layer (claim 3).

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Hashimoto et al disclose a solid oxide fuel cell according to the foregoing. However, Hashimoto et al do not expressly disclose the thickness of the second electrolyte layer being larger than the thickness of the first electrolyte layer.

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the thickness of the second electrolyte layer larger than the thickness of the first electrolyte layer in the electrolyte layers of Hashimoto et al as Hashimoto et al per se teach that the thickness of the intermediate layer (*second electrolyte layer*) is preferably within a range from 10-100  $\mu\text{m}$ , more preferably 20-90  $\mu\text{m}$ , most preferably 30-80  $\mu\text{m}$  and the thickness of the electrolyte layer (*first electrolyte layer*) is preferably within a range of 10-200  $\mu\text{m}$ . Furthermore, Hashimoto et al teach that if the electron and mixed conductor is used for the intermediate layer, the area of the two-phase interface between the electron and ion mixed conductor, available for the ionization of oxygen, can be varied. *Thus, those of ordinary skill in the art would obviously recognize that by varying the specific layer interface area of both electrolyte layers, satisfactory ion conduction and conductivity is achieved. Hence, the prior art directly teaches the use of thickness of the electrolyte layers within the claimed limitation would enhance ion conduction and conductivity at all. That is, the thickness of the second electrolyte layer (having more amount of Co) being larger than the thickness of the first electrolyte layer (having a lesser amount of Co) might be obtained* in light of the disclosed layer thickness for both electrolyte layer. Accordingly, a suitable combination of specific disclosed thickness magnitude would produce the second electrolyte layer with a larger thickness than the first electrolyte layer.

***Response to Arguments***

3. Applicant's arguments filed 05/23/03 have been fully considered but they are not persuasive.

4. Additionally, the examiner wishes to briefly address the following: a) as to the specific structural arrangement argued by the applicant, it is contended that the instant claims simply recite first and second electrolyte layers without further limiting the structural accommodation of the air electrode, the fuel electrode and the electrolyte layers to a particular and restricted arrangement wherein one layer is required to have more Co content than other and such electrolyte layer being necessarily in direct contact with any of the fuel cell components per se. That is to say, the present claims omit structural cooperative relationships of elements, and thus, such omission does not provide the required structural connection/configuration contended by the applicant; b) as for the argument of preventing electrons, discharged in the fuel electrodes, from returning into the air electrode layer and to catch these electrons securely in the fuel electrode, it is also asserted that the instant claims are also silent to it. Thus, these arguments are not commensurate with the scope of the instant claims.

***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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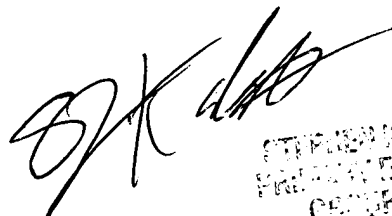
MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (703) 308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro  
Examiner  
Art Unit 1745

  
STEFAN K. ARF  
PATENT EXAMINER  
GROUP (700